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Washington, D.C. 20231

Our Ref: WH-10.752US  
Filed: February 11, 2000

Dear Sir:

Transmitted herewith for filing is the patent application of

Inventors: LEON SALTSEV AND GENNADY GAPONYUK

Title: VALIDATOR WITH REMOVABLE FLASH MEMORY

Enclosed are:

(X) 5 sheet(s) of drawings.

(X) An Assignment of the invention to CASHCODE COMPANY INC.

( ) A certified copy of a application

(X) A Petition, Declaration and Specification

(X) A verified statement to establish small entity status under 37 C.F.R. 1.9 and 37 C.F.R. 1.27.

THE FILING FEE HAS BEEN CALCULATED AS SHOWN BELOW:

For	(Col. 1) No. Filed	(Col. 2) No. Extra
Basic Fee		
Total Claims	15 -20	0
Indep. Claims	2 - 3	0
( ) Multiple dependent claims presented		

\*If the difference in column 1 is less than zero, enter "0" in Col. 2

Small Entity	
RATE	Fee
	\$345.00
x 11=	\$
x 40=	\$
+130=	\$
TOTAL	\$345.00

Other than a Small Entity	
OR	
OR	\$690.00
OR	\$
OR	\$ .00
OR	\$
OR	\$
TOTAL	\$

( ) Please charge my Deposit Account No. 040752 in the amount of \$ , a duplicate copy of this sheet is enclosed.

(x) A check in the amount of \$385.00 is enclosed to cover the filing fee (\$345.00) and Assignment recordal fee (\$40.00).

(X) The Commissioner is hereby authorized to charge payment of the following fees associated with this communication to Deposit Account No. 040752. This amount is believed to be correct. The Commissioner is also authorized to credit any deficiency and/or overpayment to Deposit Account No. 040752. A duplicate copy of this sheet is enclosed.

(X) Any additional filing fees required under 37 C.F.R. 1.16.

( ) Any patent application processing fees under 37 C.F.R. 1.17.

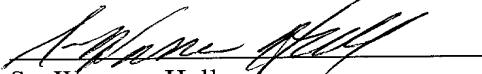
( ) The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 040752. A duplicate copy of this sheet is enclosed.

( ) Any patent application processing fees under 37 C.F.R. 1.17

( ) The issue fee set in 37 C.F.R. 1.18 at or before mailing of the Notice of Allowance, Pursuant to 37 C.F.R. 1.311 (b).

( ) Any filing fees under 37 C.F.R. 1.6 for presentation of extra claims.

Respectfully submitted,

  
S. Warren Hall  
Reg. No. 30.350

Applicant or Patentee: CASHCODE COMPANY INC. Attorney's  
Serial or Patent No.: \_\_\_\_\_ Docket No.: WH-10.752US  
Filed or Issued: \_\_\_\_\_  
For: VALIDATOR WITH REMOVABLE FLASH MEMORY

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY  
STATUS [37 CFR 1.9(f) AND 1.27(c)] - SMALL BUSINESS CONCERN

I hereby declare that I am:

the owner of the small business concern identified below  
 an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: Leon Saltsov  
ADDRESS OF CONCERN: 553 Basaltic Road  
Concord, Ontario, L4K 4W8 CANADA

I hereby declare that the above-identified Small Business Concern qualifies as a Small Business Concern as defined in 13 CFR 121.3-18 and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either directly or indirectly, one concern controls or has the power to control the other, or a third party or parties control or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the Small Business Concern identified above with regard to the invention entitled VALIDATOR WITH REMOVABLE FLASH MEMORY by inventor(s) LEON SALTOV and GENNADIY GAPONYUK described in:

the specification filed herewith  
 application serial no.: \_\_\_\_\_, filed \_\_\_\_\_  
 patent no.: \_\_\_\_\_, issued \_\_\_\_\_

If the rights held by the above-identified Small Business Concern are not exclusive, each individual, concern or organization having rights to the invention is listed below\* and no rights to the invention are held by any person, other than the inventor, who could not qualify as a Small Business Concern under 37 CFR 1.9(d) or by any concern which would not qualify as a Small Business Concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

no such person, concern or organization  
 persons, concerns or organizations listed below\*

\* NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

INDIVIDUAL  
 SMALL BUSINESS CONCERN  
 NONPROFIT ORGANIZATION

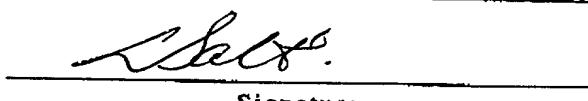
I acknowledge the duty to file, in this application or patent notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. [37 CFR 1.28(b)]

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: Leon Saltsov

ADDRESS OF PERSON SIGNING: 553 Basaltic Road

Concord, Ontario L4K 4W8 CANADA

  
Signature

Feb. 9, 2000

Date

TITLE: VALIDATOR WITH REMOVABLE FLASH MEMORYBACKGROUND OF THE INVENTION

5 The present invention relates to validators and in particular, relates to validators having a removable flash memory module.

10 A host of different types of validators receive and process banknotes to determine the authenticity thereof. The banknotes are moved past sensors which evaluate different properties of the banknotes and the sensed properties of the banknotes are compared relative to a predetermined standard maintained in memory of a central 15 processing unit of the validator. Based on this comparison a prediction as to the authenticity of the banknote is made.

20 The cost of a validator typically increases as the number of properties being sensed increases and the degree of precision increases. A compromise is normally made between the degree of accuracy a validator must meet and the percentage of bills being rejected on average. As 25 the degree of accuracy increases, the variation between the properties of the sensed bill and the standard decreases. This typically results in some authentic bills being rejected by the validator. For example, an authentic bill may be somewhat worn and the validator may reject it.

30 A further factor is the introduction of new banknotes by different governments. To a certain extent this practice is to reduce and deter fraudulent activities. Unfortunately this renders existing validators obsolete or only suitable for processing some banknotes. Under these 35 circumstances, it is desirable to replace the software used by the central processing unit in determining whether bills are authentic.

To alter the software used by a central processing unit of a validator, a skilled technician downloads new software to the central processing unit typically from a portable computer. This process is both 5 expensive and time consuming. It would be desirable to provide a more practical approach for updating validators while still providing a high level of security against fraudulent activities.

10

SUMMARY OF THE INVENTION

A banknote validator according to the present invention comprises a banknote processing channel, a series of sensors located along the channel for scanning a 15 banknote as it moves past the sensors, a central processing unit for controlling the operation of the validator and receiving and processing the signals from the sensors. The validator includes a removable memory storage arrangement insertable in a receiving location of the 20 validator. The removable memory storage arrangement, when received in the receiving location, forms an electrical communication path with the central processing unit and provides to the central processing unit the logic for operating the validator.

25

According to an aspect of the invention, the removable memory storage arrangement is a serial flash module.

30

According to yet a further aspect of the invention, the removable memory storage arrangement includes an electronic address available to the central processing unit and the electronic address is used to confirm the encoded software remains unchanged.

35

According to yet a further aspect of the invention, the serial flash module contains information to be downloaded to the central processing unit for

controlling the operation of the validator. As a security feature the central processing unit of the validator will not allow the validator to operate if a serial flash memory module is not inserted therein.

5

According to yet a further aspect of the invention, the removable flash module contains encrypted algorithms used by the central processing unit to evaluate banknotes for authenticity and the central processing unit includes decryption software for using the algorithms. In this way, the information contained in the removable memory storage arrangement is not easily available for misuse.

According to a further aspect of the invention, the serial flash module includes a read only memory which includes an identification code specific to the serial flash memory module and a rewritable memory containing encrypted operating software for operating the validator, said encrypted software including encryption of at least part of said identification code, and the validator includes encryption software for decoding said operating software for use by said validator, said validator providing a security check by comparing the at least part of the identification code which has been decoded with said identification code in said read only memory and only operates when a match is present.

The present invention is also directed to a method of updating software used by a validator in assessing banknotes and to a removable memory arrangement for upgrading a validator.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are shown in the drawings, wherein:

Figure 1 is a perspective view of a validator with a removable flash memory module;

Figure 2 is a schematic view of part of a bill validator, and in particular, the cooperation of the central processing unit of a validator and the removable flash memory module.

5 Figure 3 shows allocated memory space of the flash memory module;

Figure 4 illustrates allocated memory of the controller of the CPU;

10 Figure 5 is a flow chart of the algorithm used by the validator during startup;

Figure 6 shows a validator with a removable sensor module; and

15 Figure 7 shows the validator of Figure 6 in a service position with the sensor modules about to be inserted.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The validator 2 shown in Figure 1 includes a removable cassette 4 receives and stacks banknotes which have been processed by the banknote processing unit 8. The banknote processing unit includes a pathway for advancing a banknote from the entry slot 10 to the removable cassette 4. Sensors are located along the pathway for scanning the banknote and the signals from the sensors are fed to a central processing unit of the validator.

30 The validator includes a receiving slot 22 for receiving the removable flash memory module 20. There are several different manufacturers of flash memory modules. One such flash memory module is NX25F011 sold by NexFlash.

35 These serial flash modules are available in various capacities and the common capacities today are between 128KB - 4MB. They are quite small in size and have fast data transfer rates. This flash memory module has a simple interface with four or eight PIN contact. Information which is to be downloaded to the central

processing unit(CPU) of the validator is encrypted in the removable flash memory module and is therefore difficult to access and/or corrupt.

5                   The flash memory module 20 is divided into two distinct segments namely a read only memory and a rewritable memory. The read only memory is used by the manufacture to assign an identification code to each module. Preferably this identification code uniquely  
10 identifies the module. As this portion of the module is a read only memory it can not change. The rewritable memory is available to users to record information and in this case is used for recording encrypted software used by the validator banknote evaluation. The encrypted software also  
15 includes encryption of at least part of the identification code as a safe guard against tampering as will be more e fully explained.

When the flash memory module 20 is inserted into  
20 a validator, the CPU communicates to the flash memory module through the serial interface 40. As part of an initial communication, the CPU obtains the identification code of the module from the read only memory. In addition the CPU obtains the encrypted software. The CPU includes  
25 the capability to decode the encrypted software and carries out this function. This includes decoding and identification of the identification code or part thereof that was encrypted in the software being downloaded. This code is checked for a match with the code in the read only  
30 memory. If there is agreement it is assumed the software is authentic and has not been exposed to corruption.

With this arrangement corruption of a removable memory module is extremely difficult. The software is  
35 encrypted and includes an encrypted identification somewhere therewithin. Corruption requires decoding and the security level can be very high. Duplication of the entire sensor module is difficult due to the read only

memory. Even if this was possible the module would still provide authentic software to be used for validation. The validator is designed to only function when a memory module is present such that updating of several validators 5 requires an equal number of new memory modules.

As shown in Figure 2, the validator has a central processing unit 30 which includes a Read Only memory which maintains the main program of the validator. 10 This would include software for downloading information from the flash memory module, security software, decoder and an internal flash programmer. The software contained in the Read Only memory 32 cannot change. The CPU also includes a Random Access Memory 34 as well as the internal 15 programmable flash memory 36. This memory contains information for security and ID features and software and algorithms for evaluating currency. This is the information which changes to update the validator.

20 The serial flash memory module 20 includes new processing software for use by the validator. When the serial flash memory module 20 is inserted into the slot 22, it forms a connection with the serial interface 40 and cooperates with the CPU 30. The main program of the CPU 25 associated with the Read Only memory 32 controls the downloading of the software from the flash memory module 20 to the internal flash memory 36 and includes decoding of the information being downloaded and the security check.

30 When the validator is turned on, as shown in Figure 5, the main program in the read only memory 32 causes the central processing unit to check and determine whether the flash memory module 20 is inserted into the validator and whether it has the correct ID and whether it 35 is error free. The CPU maintains its own copy of the unique identification code of the serial module which is compared with the identification code of the read only memory of the module. If the program in the CPU flash

memory 36, and the serial flash memory of the module 20, contain the same version of the software, the validator starts to function. This would be the case if the validator has previously received the serial flash memory 5 module 20 and has downloaded the software of the module to the internal flash memory 36. If the flash memory has been inserted into the validator for updating of the validator, the CPU and the removable flash memory cooperate to download the program from the module to the flash memory of 10 the CPU. The data from the serial flash memory module is decoded and used to program the internal CPU flash memory 36. If the serial flash memory module 20 is not present, the validator will produce an error message and will not process banknotes.

15                   When a flash memory module is first inserted  
                  into a validator, a communication sequence or exchange  
                  occurs between the CPU and the flash memory module. The  
                  serial number or other unique information of the memory  
20                    module is read by the CPU from the read only memory of the  
                  flash memory module and stored in the CPU. The CPU then  
                  downloads and decodes the encrypted software and performs  
                  the security check with respect to the identification code  
                  which was also encoded. If all steps are satisfactory the  
25                    validator has been updated and will function with the  
                  updated software.

If the memory module is removed and inserted in a different validator a similar process will occur. The original validator will not function until a memory module is inserted therein and will go through the process again.

With the above arrangement where the flash memory module becomes a necessary part of the validator for operation thereof. In this way, the software is controlled in an effective manner and appropriate software for each validator is required. Furthermore, the information contained in the flash memory module is encrypted, and

therefore, it is not possible to easily determine the controlling software used by the validator. The validator includes its own encryption software to allow decoding of information downloaded to the validator from the flash 5 memory module.

As can be seen in Figure 3, the flash memory module has the memory thereof, divided into a number of segments, many of which are associated with security 10 features. Similarly, the CPU has a different memory, as indicated in Figure 4.

Returning to the flow chart of Figure 5, upon power up, the CPU runs a self check with respect to the 15 cooperation between the central processing unit and the flash memory module. The CPU obtains from the flash memory module, a manufacturer ID. If this is confirmed, then the next step is to check the security flash memory module ID and subsequently check the software version to confirm they 20 are the same. If the manufacturer ID or the flash module ID are in disagreement, an error status report is generated. If there is a difference in the software version, then the CPU cooperates with the flash memory module to download the new program to the flash memory of 25 the CPU. After this step, it goes through a verification program and returns the system to a start up situation, for verification. This verification should result in the validator working as the program has been updated.

30 As can be appreciated from the schematics of Figure 3 and 4 some information such as software version can be part of the rewritable memory and may not be encoded. Therefore The rewritable memory may include both non encoded and encoded information(operating software). 35 All of the information can be encoded if desired.

Design Review Report

The operating software of the memory module is preferably downloaded to the internal flash memory of the validator.

5                   With this system, the CPU of the validator, can at the time of manufacture, include in a secure manner, the necessary programming and logic which will allow updating thereof by downloading information from the flash memory module. It is initially provided with its own removable  
10                   flash memory module and could operate for its entire useful life without any updating. On the other hand, if it is found that it is necessary to update the validator to increase the security features thereof, or to allow the validator to detect new banknotes, the programming of the  
15                   validator can be updated.

This is accomplished by sending to the owner, or otherwise providing at the validator, a new flash memory module, and replacing the existing flash memory module with  
20                   the new module. The validator is then turned on and goes through its own logic sequence to download the new program to the validator. It also writes certain information to the flash memory module, such that flash memory module cannot be used with other validators. As can be  
25                   appreciated, the validator effectively carries out the downloading and the verification sequences when a new module is inserted, and therefore, this can be accomplished by an unskilled, authorized person. It does not require a skilled technician nor does it require special tools or  
30                   other expertise. These flash memory modules, once programmed, can be sent by mail to the owner of the validators and he can arrange for updating by any one who is familiar with the units, such as someone who is servicing the validators to remove banknotes stacked in the  
35                   cassette. This arrangement provides full security with the ease of convenient updating.

Another feature of the invention is the ease of programming the validator by the manufacturer. The programming by the sensor module also allows ease in changing from one currency to another. The validator can 5 include removable sensor modules as shown in Figure 6 and Figure 7 allowing the type and location of the sensors to easily change by replacing one sensor module with a different sensor module. The programming for determining authenticity can change by changing the memory module. 10 Sensor modules of different types and memory modules of different types can be maintained in stock and only associated with a validator when a particular order is received. This reduces inventory and also reduces problems associated with obsolete stock caused by new processing 15 software and/or improved sensor modules.

The validator 62 of figures 6 and 7 includes a two part housing comprising a fixed part 64 and a pivoting part 66. Figure 6 shows the operating position and figure 7 shows an open service position. Banknotes are inserted in slot 74 and advanced past the removable sensor modules 80 and 82. These modules are positioned on opposite sides of the scanning path 72 and form part of the walls of the scanning path. The fixed part of the housing includes the 20 CPU 100, the removable memory receiving slot 122, and the removable flash memory module 120. An accepted banknote is feed to a stacking cassette through the discharge outlet 25 76.

30 The sensor modules are located in recesses 81 and 83 to opposite sides of the path. Each sensor module includes an electrical connection 85 for connection with an electrical connection of the validator. As shown in Figure 6 each sensor module can have multiple sensors and 35 preferably the module converts the sensor signals to digital signals feed to the CPU. The validator of Figures 6 and 7 have the advantage of fast modification with respect to both sensors and processing software. This

allows the validator to be of a general design and convertible to a particular application and currency by choosing the appropriate sensor modules and programming software when the actual application is known.

5

The removable memory module can cooperate with the CPU of the validator in other ways. For example the CPU can personalize the removable memory module such that it can not be used with other validators once it has been used to update a particular validator. The flash memory module 20 can include a writable address which is written to by the validator to personalize the module to the validator. When the flash memory module 20 is inserted into a validator, the CPU communicates to the flash memory module through the serial interface 40. As part of an initial communication, the CPU writes to the writable address of the flash memory module, the serial number of the CPU and the flash memory maintains this address as a one time write memory. As such this information can not be changed or over written. This arrangement is particularly advantageous in that the serial flash memory module, once inserted in an appropriate validator, has the serial number of that validator written to the flash memory module.

25

The interaction between the CPU and the flash memory module is such that the flash memory module cannot be used for updating other validators. It is also possible to have the CPU write to this one time writable memory once updating of the CPU has been completed successfully. In this way the memory module is not limited to a particular validator until the validator has been updated. The CPU is programmed to look to this writable memory upon insertion of the module and confirm it has not been used to update a different validator.

35

When a flash memory module is first inserted into a validator, a communication sequence or exchange occurs between the CPU and the flash memory module. The

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serial number or other unique information of the validator is forwarded from the CPU to the flash memory module and stored in a one time writable address associated with the flash memory module. This step then dedicates that  
5 particular flash memory module to that particular validator. If that flash memory module is removed and inserted in a similar type validator, the CPU of the second validator will start an initial communication with the flash memory module and it will be determined that the  
10 identity of that second validator is not the same as the address or code which has been written into the writable area of the flash memory module. This recognition will then stop any downloading of information and result in an error message.

15

A further feature of the system is that the validator will not function without the flash memory module  
20.

20

The personalizing of the memory module to a validator provides additional control on the use of the memory module and provides additional control for the manufacturer as the updates are being carried out to a large extent outside of his control. Updating of each  
25 validator requires a new memory module and therefore some control is returned to the manufacturer.

This feature of rendering the memory module dedicated to a particular validator can be used in  
30 combination with the security feature associated with the serial number of the memory module and the encrypted software previously described.

In some cases the updated validator can benefit  
35 from having additional memory capacity available to it for the normal operation thereof. The removable memory arrangement can have additional capacity over and above that needed for software to be downloaded which is

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available to the CPU. It is also possible, although not preferred to delete the dwonloaded software and thus make this memory space available. This modification would also require modification of the initial power up procedure of the validator.

Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A banknote validator comprising a banknote processing channel, a series of sensors located along said channel for scanning a banknote as it moves past said sensors, a central processing unit for controlling the operation of said validator and receiving and processing the signals from said sensors, and a removable memory storage arrangement insertable in a receiving location of said validator, said removable memory storage arrangement when received in said receiving location forming an electrical communication path with said central processing unit and providing thereto logic for operating said validator.
2. A banknote validator as claimed in claim 1 wherein said removable memory storage arrangement is a serial flash module.
3. A banknote validator as claimed in claim 1 wherein the removable memory storage arrangement includes an electronic address available to the central processing unit and the electronic address is used to confirm the encoded software remains unchanged.
4. A banknote validator as claimed in claim 1 wherein the serial flash module contains information to be downloaded to the central processing unit for controlling the operation of the validator and said central processing unit of the validator will not allow the validator to operate if a serial flash memory module is not inserted therein.
5. A banknote validator as claimed in claim 3 wherein the removable flash module contains encrypted algorithms used by the central processing unit to evaluate banknotes for authenticity and the central processing unit

includes decryption software for decoding the algorithms and storing the decoded algorithms in said central processing unit.

6. A serial flash module for updating a validator comprising a read only memory which includes an identification code specific to the serial flash memory module and a rewritable memory containing encrypted operating software for operating a validator, said encrypted software including encryption of at least part of said identification code.

7. A banknote validator as claimed in claim 1 where said removable memory storage arrangement contains encrypted information and said central processing unit includes logic for using the encrypted information.

8. A banknote validator as claimed in claim 7 wherein said removable memory storage arrangement provides additional memory available to said central processing unit.

9. A banknote validator as claimed in claim 1 wherein said validator includes a testing procedure for evaluating the integrity of said removable memory module when inserted into said validator.

10. A banknote validator as claimed in claim 1 wherein said removable memory storage arrangement contains encrypted algorithms used by the central processing unit to evaluate banknotes for authenticity.

11. A banknote validator as claimed in claim 1 wherein said validator includes an electronic address available to said central processing unit, and said removable memory storage arrangement includes a memory location for storing the electronic address of the

validator when received in said removable storage arrangement.

12. A banknote validator as claimed in claim 2 wherein said serial flash module contains information to be downloaded to said central processing unit for controlling the operation of said validator, said serial flash module after downloading of said information including a security feature such that said serial flash module can not be used with other validators.

13. A banknote validator as claimed in claim 11 wherein said serial flash module records the electronic address of the validator when received in said receiving arrangement and only communicates with said central processing unit when there is a match between the recorded electronic address and the electronic address provided by the validator.

14. A banknote validator as claimed in claim 1 wherein said removable memory storage arrangement provides additional memory available to said central processing unit.

15. A banknote validator as claimed in claim 1 wherein said removable memory storage arrangement contains encrypted algorithms used by the central processing unit to evaluate banknotes for authenticity.

ABSTRACT OF THE DISCLOSURE

A banknote validator includes a banknote processing channel, a series of sensors located along the channel for scanning a banknote as it moves past the sensors, a central processing unit for controlling the operation of the validator and receiving and processing the signals from the sensors. A removable memory storage arrangement is insertable in a receiving location of the validator. The removable memory storage arrangement, when received in the receiving location, forms an electrical communication path with the central processing unit and provides to the central processing unit the logic for operating the validator. Preferably, the removable memory storage arrangement is a serial flash module having its own electronic address used by the validator to confirm the encoded software being downloaded to the validator has not been tampered with. As a further preferred security feature the validator is designed such that it will only operate when a removable flash module is received in the validator.

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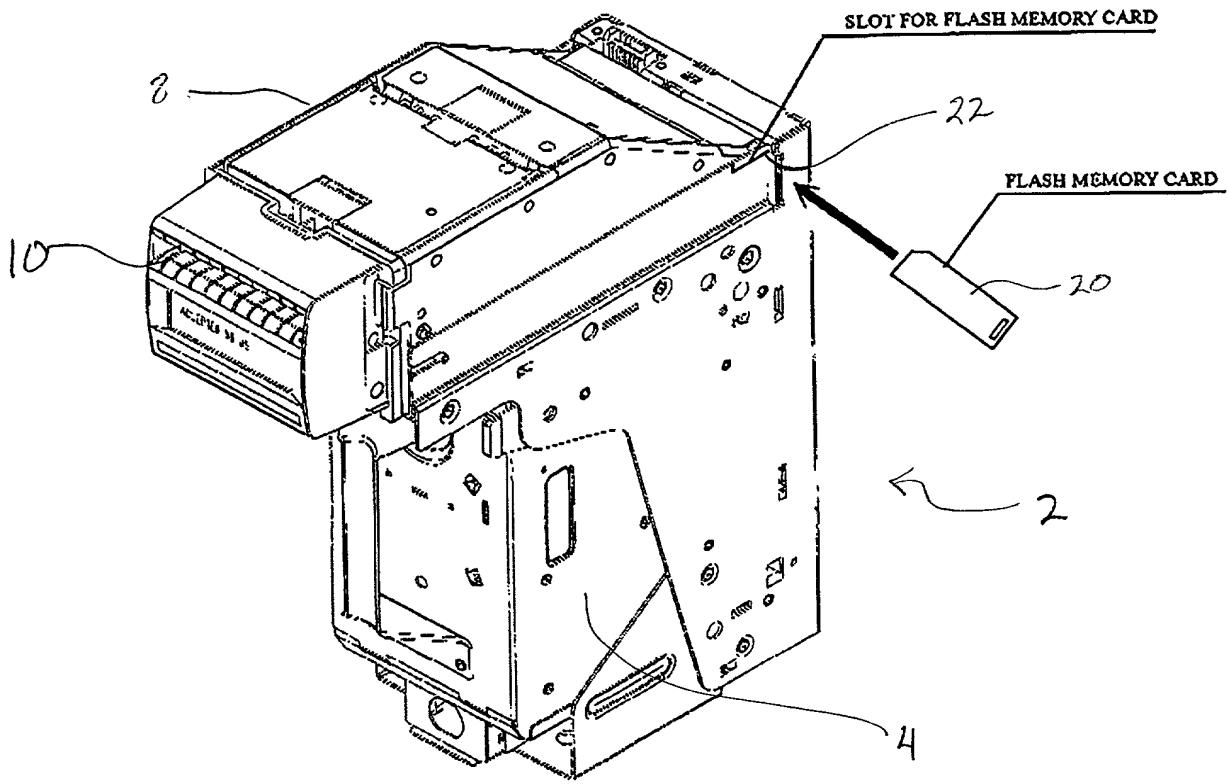


FIG. 1

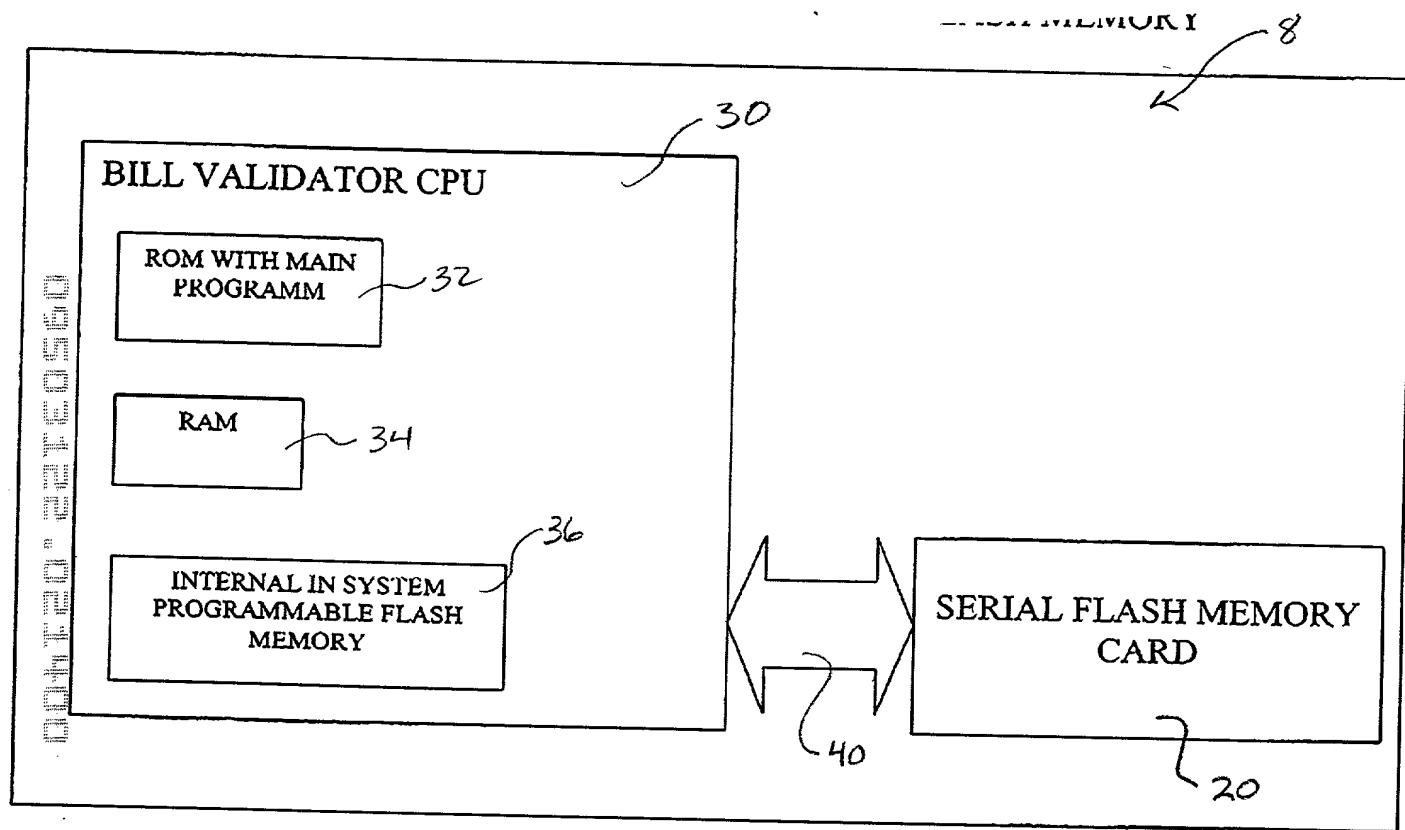


FIG. 2

## FLASH CARD MEMORY SPACE

MANUFACTURER ID
PART COMPABILITY
PACKAGE SPEED
TEMP.,VOLTAGE
RESERVED
CHECKSUM MSB
CHECKSUM LSB
RESERVED
SERIAL NUMBER -once programmed memory field
SOFTWARE VERSION
CHANGEABLE PART OF MAIN PROGRAMM FOR DOWNLOAD

FIG. 3

## MAIN CONTROLLER MEMORY SPACE

MAIN PROGRAMM
LOADER FOR AUTOMATIC DOWNLOAD
SECURITY SOFTWARE MANAGER
SECURITY DECODER AND INTERNAL FLASH PROGRAMMER

FIG. 4

## FLASH MEMORY CARD INTERFACE WORKING ALGORITHM

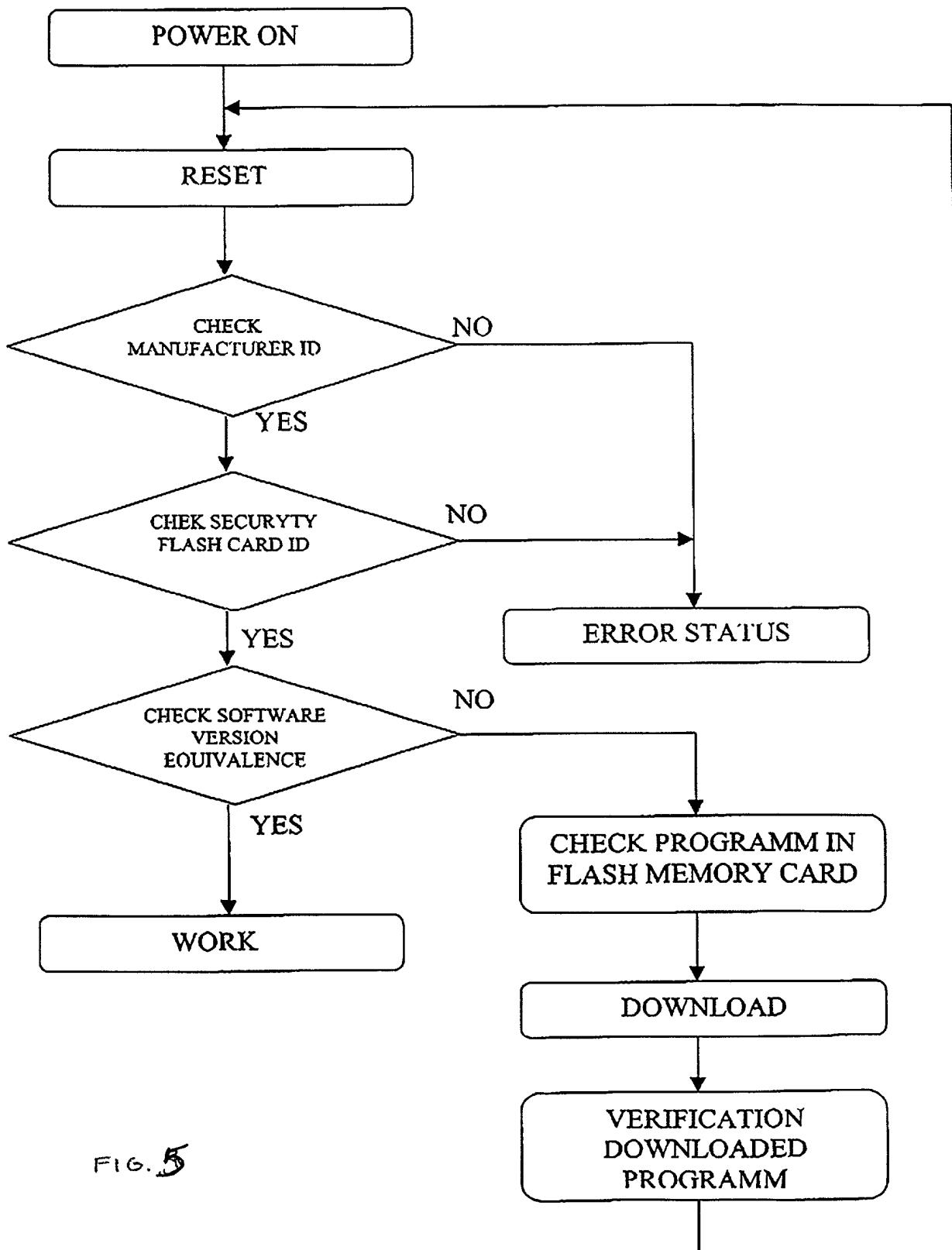


FIG. 5

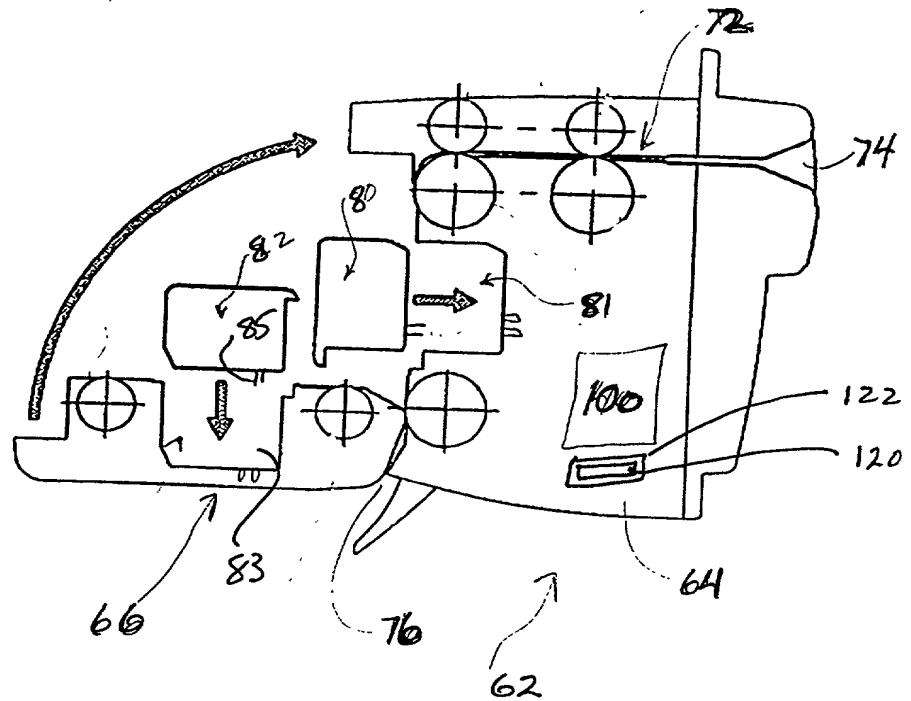
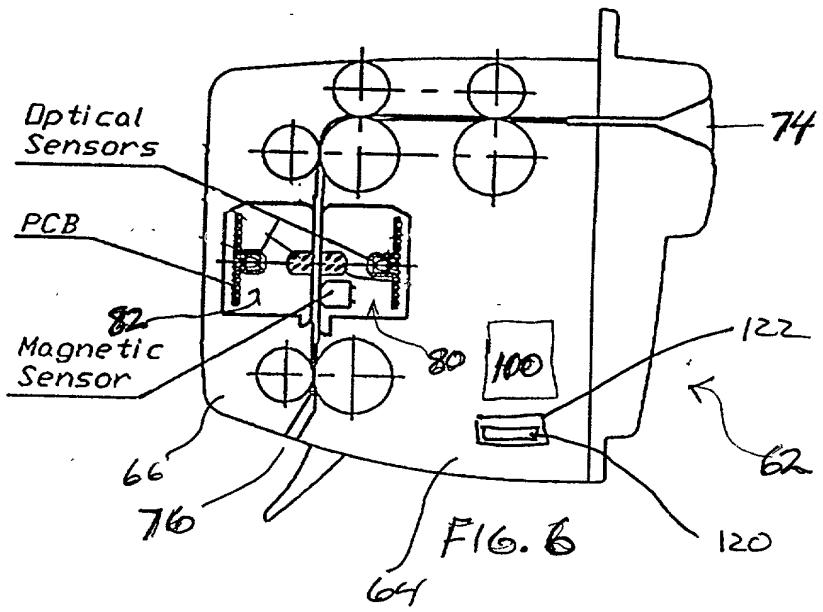


FIGURE 7

UNITED STATES

**PETITION, DECLARATION AND SPECIFICATION**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled \_\_\_\_\_

**VALIDATOR WITH REMOVABLE FLASH MEMORY**

the specification of which

is attached hereto.

was filed on \_\_\_\_\_ as

Application Serial No. \_\_\_\_\_

and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s):

Priority  
Claimed

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

yes       no

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined by Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Appln. Serial No.)

(Filing Date)

(Status: patented, pending, abandoned)

And we hereby appoint the following as our attorneys or agents to prosecute this application and to transact all business in the Patent Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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